

## Systems And Problem Solving Part 2

### By Thomas Park

In mathematics, we have a property we call “commutative”. With this property, if  $a = b$ , and  $b = c$ , then  $a = c$ . Some functions are commutative, others are not.

There is a symbol we use to approximate:



It is like an equals sign, but has wavy lines, instead. In problem solving terms, it is important to note that the approximation function really ISN'T commutative. In other words, if  $a \approx b$ , and  $b \approx c$ , that does not necessarily mean that  $a \approx c$ .

The reason for this is that as we continue to carry approximations like these out commutatively between more and more variables, we get a widening range of what could be considered approximate-- and we risk falling out of that region.

So, equality is commutative, and approximation really isn't.

Similarly, a person should differentiate between a probability and an actuality. An event that is likely to happen can not be said to be guaranteed to occur. Rather, it remains probable-- that it might.

If we accept a probability as an assumed case, we run the risk of either being incorrect-- or even influencing the outcome of the case (perhaps inadvertently).

For example, with some political races (not all), when one candidate has been assumed to be a probable victor, that candidate then garnishes even more of the votes, as voters may conclude they will win.

Furthermore, in any case of gathering data, it must be remembered that the person who is gathering data is part of the system as a whole, and that they might have biases and other limitations. For example, if a person reports how many “serious crimes” happen in a region, the

figure they convey will depend on how they define serious crimes. Are all crimes serious? Only felonies? Particular felonies? Where do we draw the line, and who decides this?

Such issues are part of problem solving, and they explain some of the discrepancies we see in news and other reports. Perhaps that is one reason why so many contemporary people have a hard time believing what they read.

They also bring up a need for the use of sound logic and grounded ethics when solving problems, and gathering and analysing data.